Results of Open-Heart Surgery in High-Risk Patients

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Of 732 patients undergoing open heart surgery in Pars Hospital Tehran, 127 were classified in a high risk surgical category. Of these, there were 19 mortalities. Three main groups of patients were studied; Group I consisted of those with congenital disorders, such as Ebstein's anomaly and the medical-necrosis type of ascending aneurysms; Group II consisted of reoperaton cases; and Group III was composed of patients with cardiomegaly who required double or triple-valve surgery.

IN RECENT years, the prognosis after surgery in high-risk patients has been improved with the increased safety of the extracorporeal heart/lung machine[1]; protection of the myocardium by means of systemic or topical hypothermia[2]; applications of various cardioplegic solutions[3,4]; the discovery of new drugs; and overall improvements in surgical techniques. During a 6-year period in this institution, 732 cases of open-heart surgery were performed, with 45 mortalities (6.1%) (Table I). Among the 732 cases, there were 127 patients considered to be in high-risk surgical categories (19 mortalities); they were classified as follows: (1) Patients with some congenital malformations, such as Ebstein's anomaly,[5-7] and the medial necrosis type of ascending aortic aneurysms; (2) all reoperative cases (with or without pulmonary edema) in the acute stages; and (3) all Class IV,* bed-ridden patients (with or without edema and ascites) requiring double- or triple-valve surgery. The distribution of high-risk cases is shown in Table II.

Patients Studied

Group I: Congenital Disorders/Ascending Aortic Aneurysms

Patients with Ebstein's anomaly are considered high risks for surgery because of arrhythmias that may

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manifest postoperatively. In this group, there were three patients—a girl, aged 17, and two men, aged 21 and 27. One patient underwent a Hardy-type repair and died 48 hours later of dysrhythmias. Tricuspid valve replacements with Carpentier-Edwards porcine valves were performed on the other two patients; both are well 2 and 3 years postoperatively.

There were five cases of the medial-necrosis type of ascending aortic aneurysms.[8] One of the patients, a 17-year-old girl, died of postoperative hemorrhage 48 hours after surgery. In this case, the aneurysm had been repaired with a Dacron graft. Because of the large size of the aneurysm and the possibility of rupture, cardiopulmonary bypass was initiated via the femoral vein and artery prior to opening the chest.

In the other four cases, the aneurysms were not as large. Operative procedures were carried out in a routine fashion: the ascending aorta was replaced in two cases. Aortic valve replacement with No. 27 Carpentier-Edwards porcine valves was also required in the two remaining cases. All four patients were well 6 to 18 months later.

There are two potential problems to consider in the surgical treatment of ascending aortic aneurysms:

1. *Displacement of the coronary arteries, particularly the right coronary artery, due to dilatation of the aortic root.* After aortic clamping and opening of the aneurysm, the origin of the coronary arteries should be located. Then, the ascending aorta should be cut.
   If the displacement interferes with aneurysm resection, an aorto-right coronary bypass with the saphenous vein should be performed following repair of the ascending aorta.
2. *Danger of postoperative hemorrhage due to the thin wall of the aorta.* Upon completion of the resection, the graft should be su-

TABLE I. Open-Heart Procedures for Congenital and Acquired Disease (June 1975-June 1981)

		Men	Women	Deaths
Congenital Heart Diseases		99	73	14
Acquired Heart Diseases		302	258	31
	Total	401	331	45 (6.1%)

TABLE II. Distribution of High-Risk Surgical Cases: Congenital and Acquired Heart Diseases

		Cases	Deaths
Congenital Diseases			
Ebstein's Anomaly		3	1
Ascending Aortic Aneurysm (Medial Necrosis)		5	1
	Total	8	2
Acquired Diseases			
Mitral Valve Reoperation		68	8
Aortic Valve Reoperation		17	3
Double Valve Procedure		25	4
Triple Valve Procedure		9	2
	Total	119	17
Congenital and acquired	TOTAL	127	19

tured to the aorta and reinforced with a Dacron strip. Following anastomosis, French-made biological glue is also used.

Group II. Reoperative Cases/Double-Triple Valve Replacements

Reoperative cases are also high risk. A report from Columbia University substantiated this in recording a 19% mortality rate in reoperative patients.[9] However, other reports indicated no differences between the mortality rates for reoperative cases and first-time procedures. Some of the potential dangers involved in reoperation are: (1) Increase of postoperative hemorrhage due to adhesion and lysis of adhesion at reoperation; (2) risk of rupture of the posterior wall of the left ventricle due to lysis of adhesions; and (3) risk of coronary injuries during the second operation with lysis of adhesions.

Since bleeding is more difficult to control on the left side of the heart, lysis of adhesions should be prevented if possible. Air may be evacuated by way of the interatrial groove, with decompression accomplished in a similar manner with atrial and ventricular catheters, or a Foley catheter. If defibrillation is required, the blade of the defibrillator should be applied extrapericardial to the left side.

In treating high-risk surgical patients, late complications should be considered, such as malfunctioning or clotting of artificial valves, and certain risks involved in redoing coronary bypasses or repairing congenital defects. In many cases, partial closure of the pericardium may facilitate a second operation. To accomplish this, two incisions are made, the first in the diaphragmatic region and the second proximal to the superior vena cava. This will help to prevent rupture of the right ventricle during a second opening of the sternum.

Sixty-eight patients underwent reoperation for mitral valve disorders (Table III). In addition, there were 17 patients who underwent reoperation for aortic valve disorders (Table IV). Since 1975, only porcine valves have been used in this institution for mitral, aortic and tricuspid valve replacements. Before that time, Starr-Edwards and Björk prosthetic valves were used. There were over 150 cases of mitral valve replacements with the low profile disc Starr-Edwards valve (Model 6520). In addition, there were 48 cases of aortic valve replacements with Starr-Edwards ball valves (Models 1200 or 1260). Of the 65% patient follow-up, there were no reports of malfunctioning or clotting in the Starr-Edwards valves.

Since 1975, with our exclusive use of porcine valves, there have been no reported cases of malfunctioning or rupture, cusps, clotting or emboli, except one, which involved subacute bacterial endocarditis. That patient was treated conservatively but required 3 months of hospitalization and treatment.

Group III: Class IV Patients Requiring Double- or Triple-Valve Surgery

The third group of patients considered to be in the high surgical risk category are

TABLE III. Mitral Valve Reoperative Procedures

	Patients	Deaths
Closed Mitral Commissurotomies		
2 to 20 years postop	50	3
Clotted Mitral Valve Prostheses		
5 to 10 years postop		
Non-emergency surgery	15	2
Emergency surgery	3	3
Total	68	8

TABLE IV. Aortic Valve Reoperative Procedures

	Patients	Deaths
Aortic Valve Commissurotomies	3	0
Clotted Aortic Valve Prostheses		
Non-emergency surgery	14	3
Total	17	3

Class IV patients. They have cardiomegaly and require double or triple valve procedures. The distribution of cases is shown in Table V. In tricuspid valve procedures, plastic repair or use of the Carpentier ring was preferred unless total replacement was warranted by the deterioration of the valve.

Conclusion

Important considerations in the surgical treatment of high-risk patients are (1) partial closure of the pericardium to facilitate reoperation; and (2) in reoperative cases, the avoidance of lysis of adhesions to minimize postoperative bleeding. Such precautions will help to prevent damage to the coronary arteries or rupture of the posterior portion of the left ventricle during surgery.

TABLE V. Valve Procedures in Class IV Patients

Procedures	Patients	Deaths
Double Valve Procedures		
Aortic and Mitral Valve Replacement	15	2
Mitral and Tricuspid Repair/Replacement	10	2
Triple Valve Procedures	9	2
Total	34	6

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